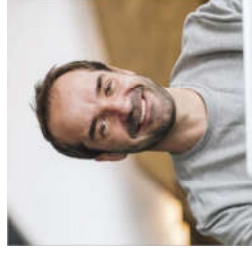
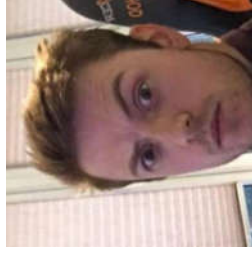
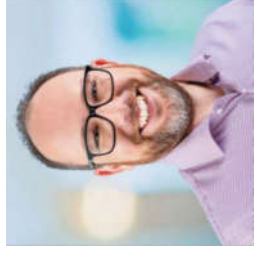
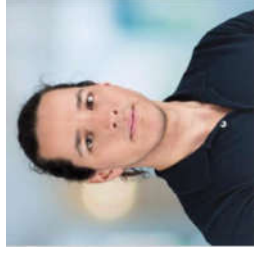
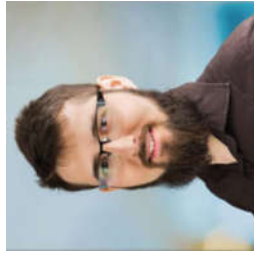
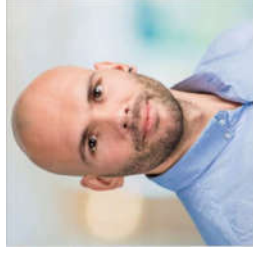


# Making Sense of Data in Real-Time

Seminar Smart Data Practices  
31 January 2019

# We are Axual



# Our north star

## “ Streaming Made Simple ”

We enable customers to create business value using streaming data in a matter of hours, while guarding enterprise governance and security.

Software

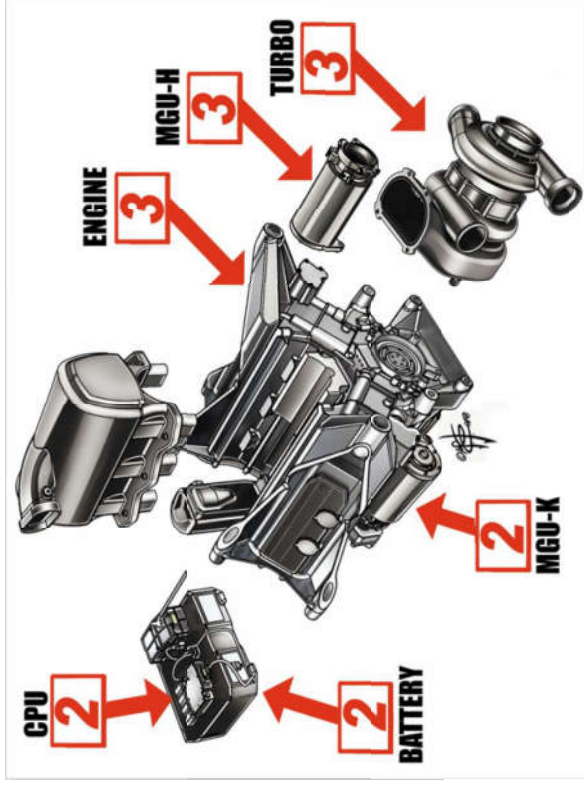
Cloud

Services

Axual Platform  
On-premise & Cloud

Managed Service  
Consultancy  
Training

# Comparing Stream Processing with Formula 1



Enterprises that want to start with streaming often have difficulty to get going, because Kafka is not easy to understand. Kafka is a terrific Formula 1 engine, capable of outperforming the competition easily, but for most organizations the engine itself is too complex to use directly. That's why Axual built a car around it. Ready to use. Step in and get going. And if you need driving lessons first, we offer those too!



# Axual customers



MONTRICHARD GROUP



info.nl



Xomnia





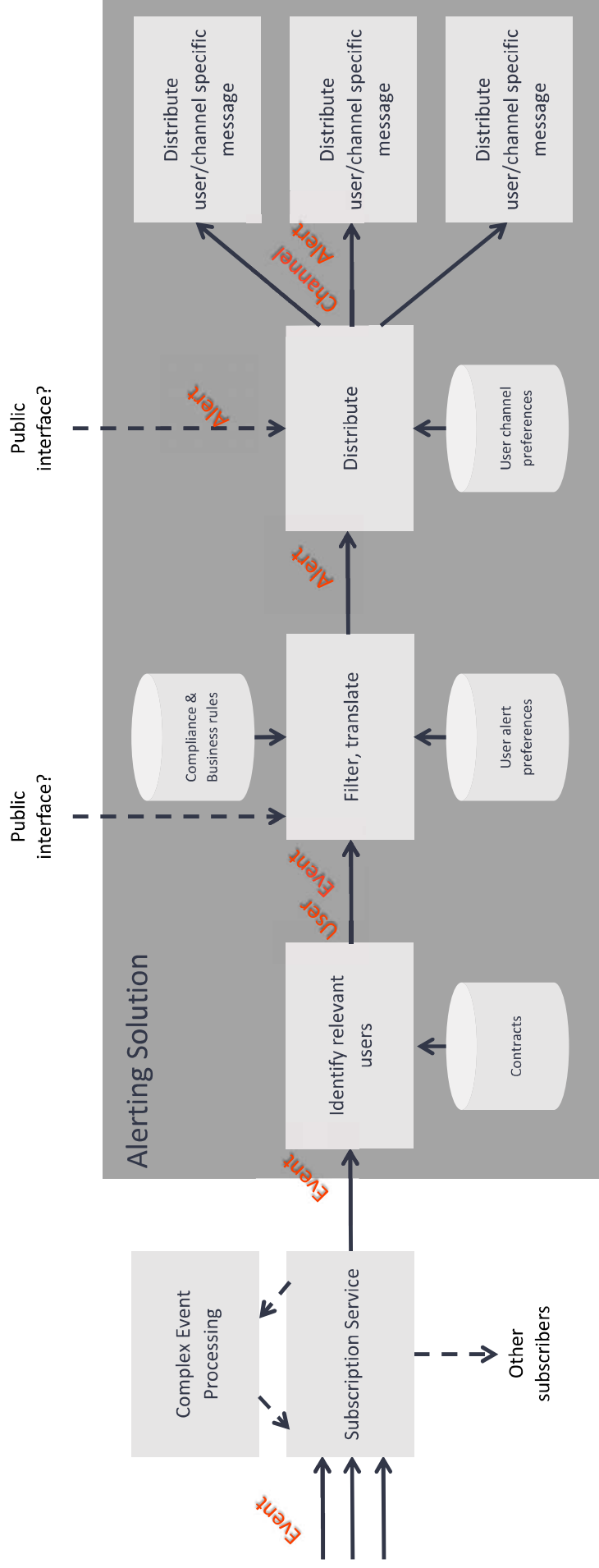
# About Rabobank



# Some digital highlights



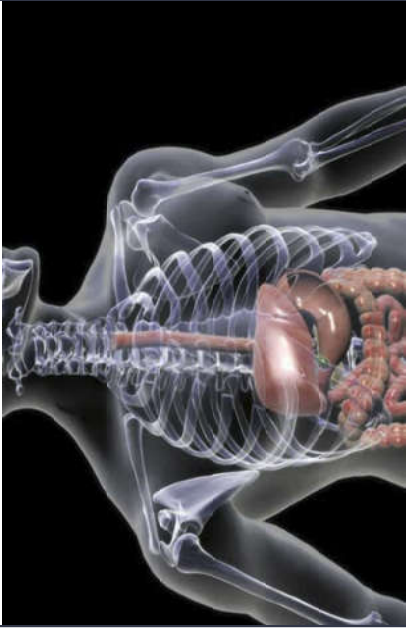
# Redesigning Rabo Alerts





# Three fundamental mechanisms for data logistics

## Time-driven: Digestion



### “Data warehouses”

- Typically 3 times per day
- Batches
- Fixed process
- Slow but predictable

## Request-driven: Movement



### “SOA / API”

- Millions of times per day
- Individual commands
- Two involved parties
- Requires specific intent

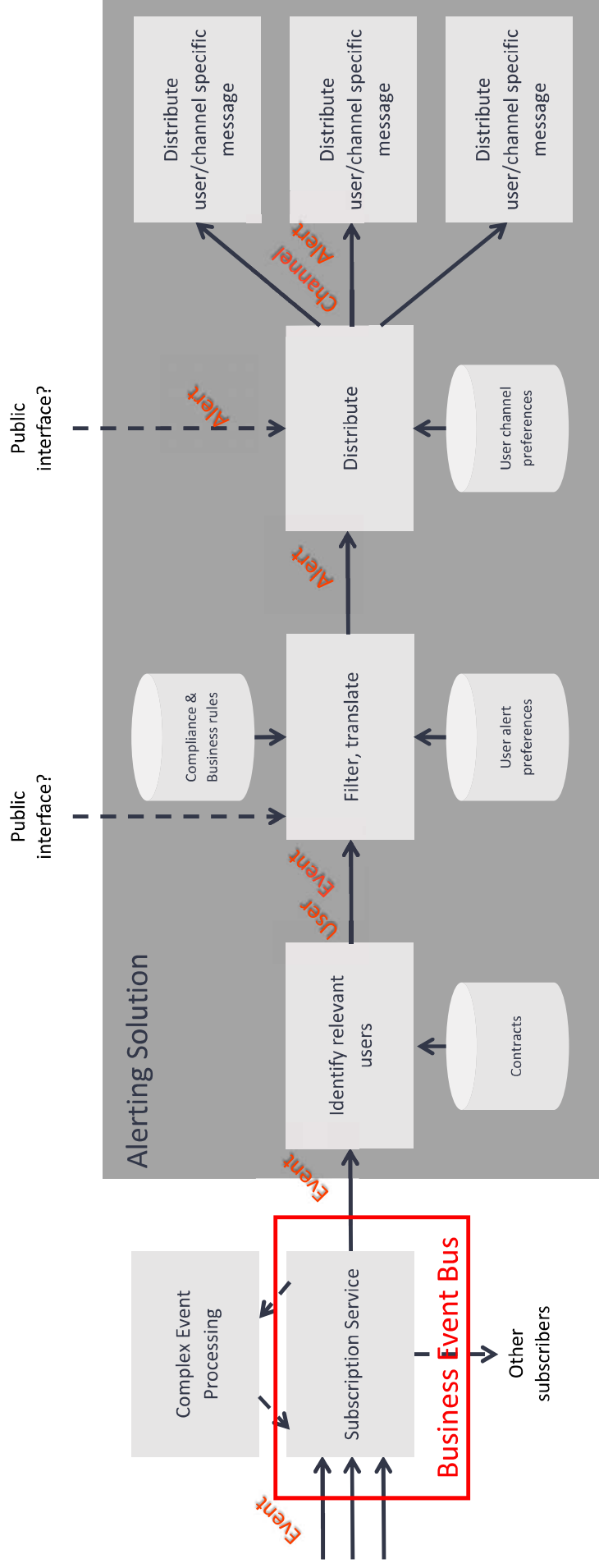
## Event-driven: Nervous system



### “Event-driven architecture”

- Millions of signals per day
- Individual observations
- Contextual processing
- Network of systems

# Redesigning Rabo Alerts



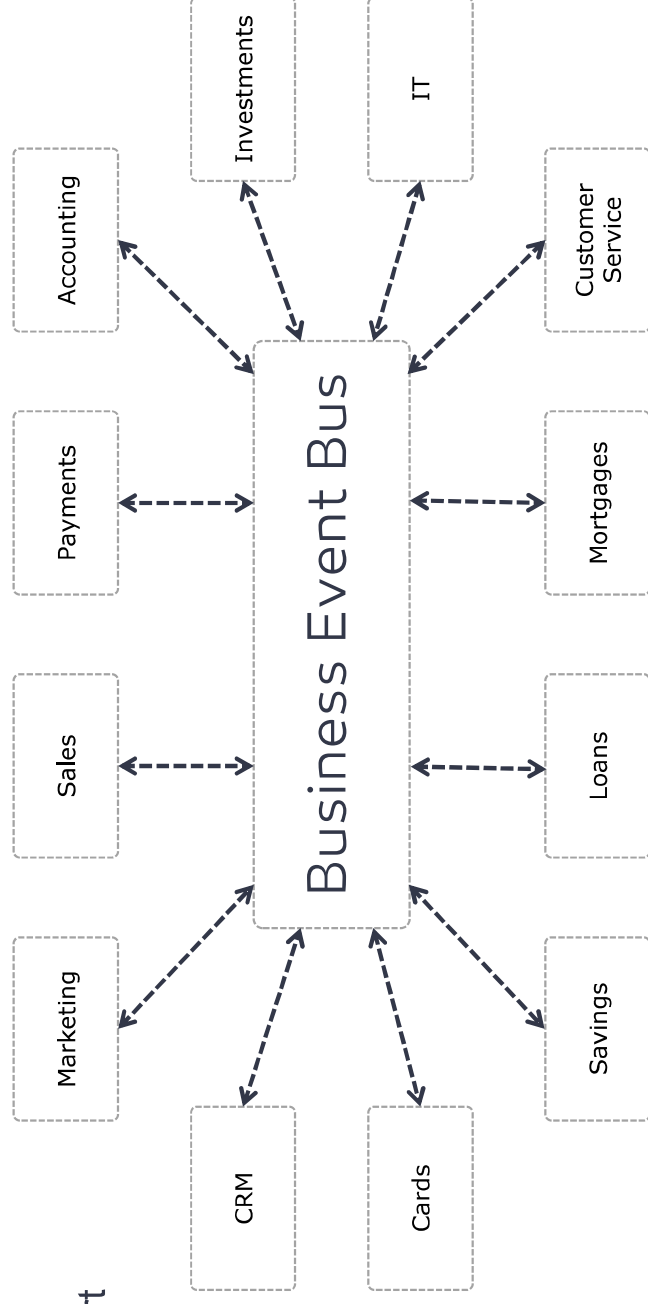
# What is Business Event Bus?

A marketplace where applications exchange **Business Events** at the moment they occur.

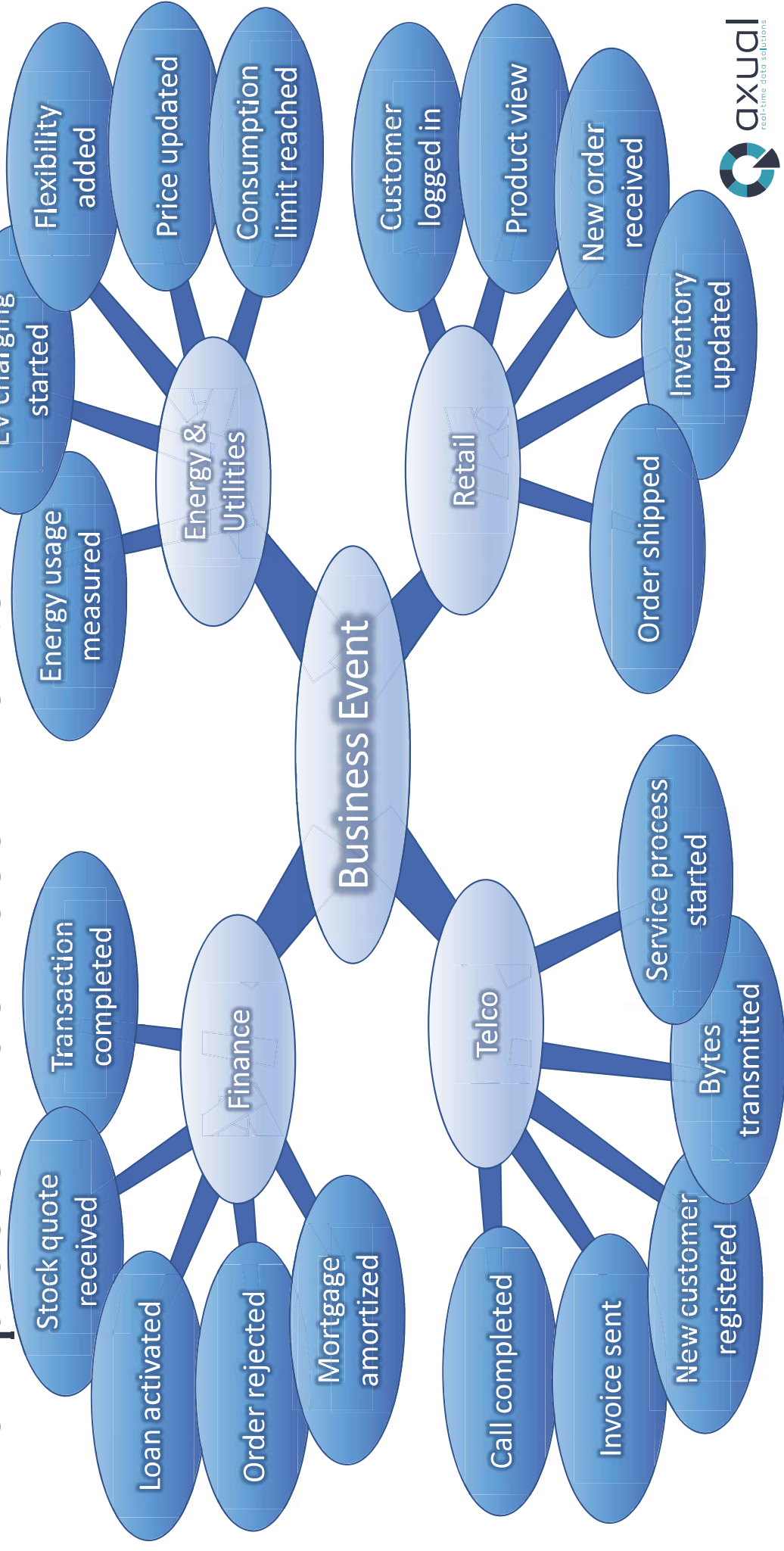
A Business Event is a something that happens or takes place to which organizational entities might want to react.

Objective: BEB provides all the tools, mechanisms and processes to support organization-wide event sourcing.

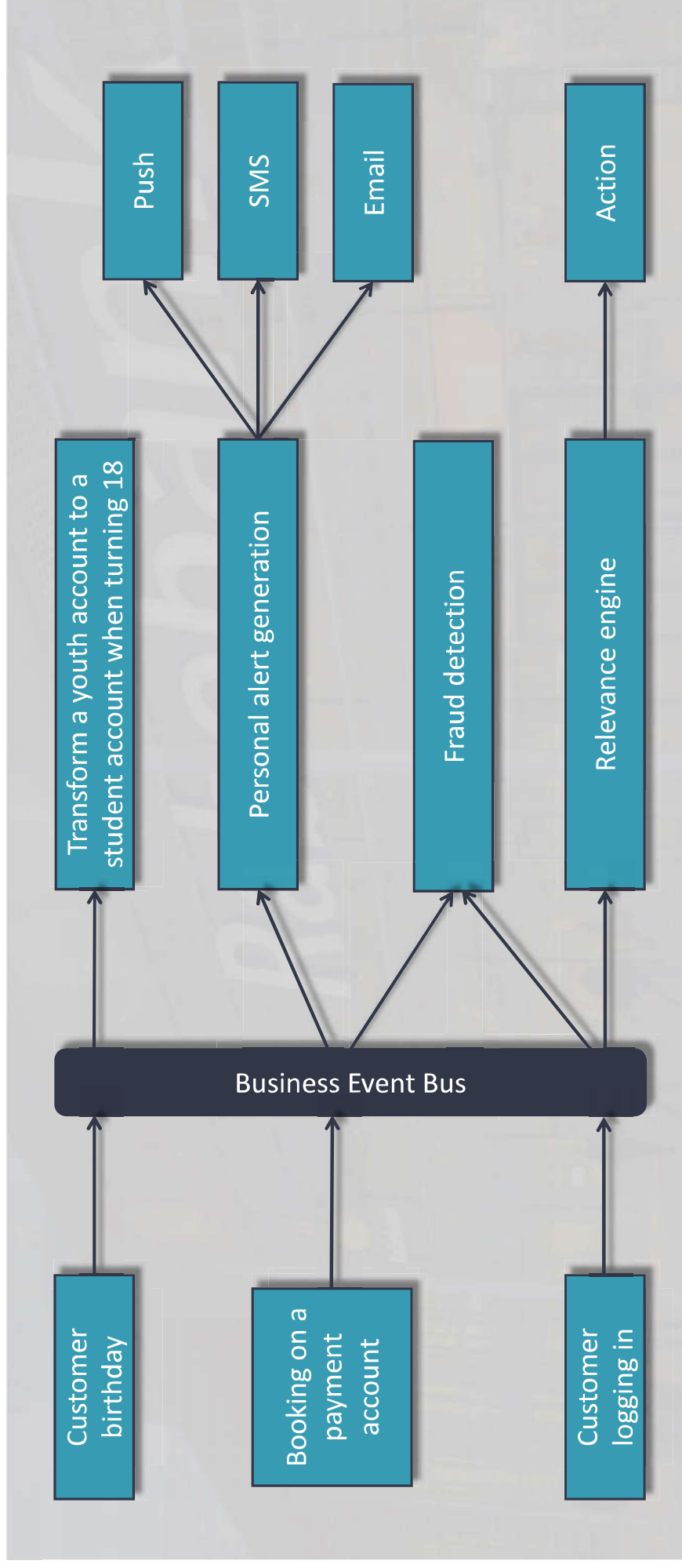
Collaboration between Rabobank and Axaal for design, build & run.



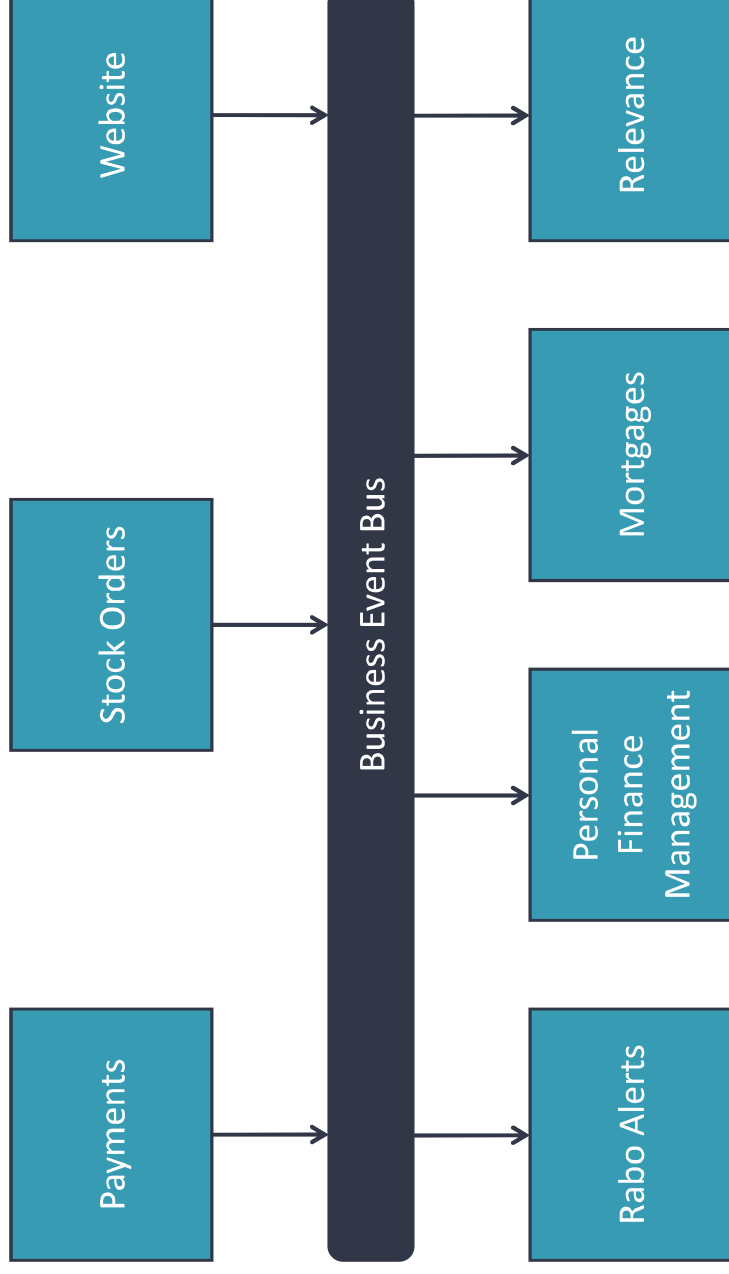
# Examples of Business Events



# Examples of event-driven banking



# “Sharing events” caught on quickly



High Confidentiality, Medium Integrity, High Availability



# What makes an ideal streaming platform?

## Characteristics

- Always available
- Easy to use
- Standardized
- Self-Service
- Low maintenance

## ...while respecting enterprise requirements

- Integration with Corporate Directory
- Data Security
- Data Governance



# Bridging the requirements gap





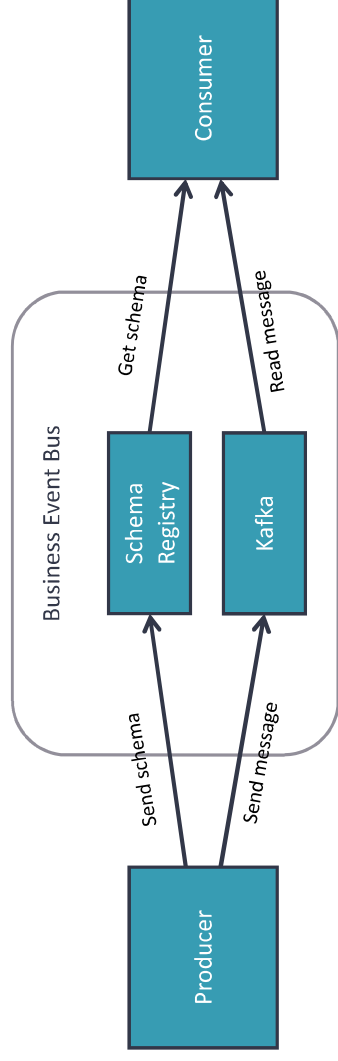
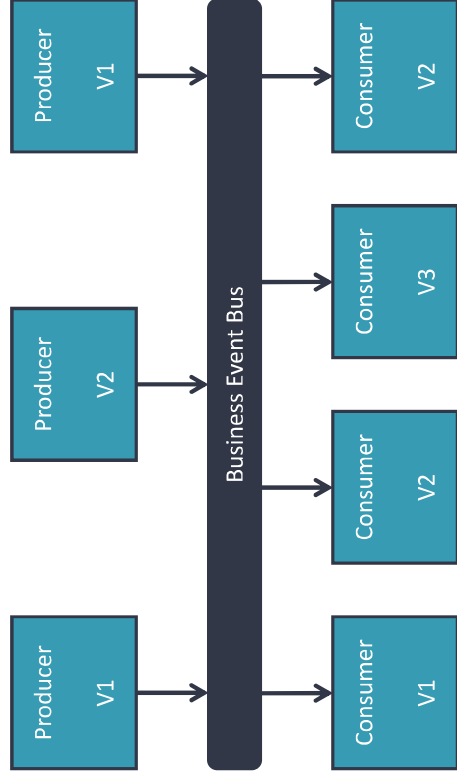
# Bridging the requirements gap



# Bridging the requirements gap



# 1. Design for Schema Evolution



## 2. Information Object Model

**Events are Information Objects\*** that adhere to the following principles

- Events represent one-and-only-one specific thing that took place
- Events are self-descriptive and contextless\*\*
- Events are uniquely identifiable
- Events are timestamped

**Examples of business events are**

- Transaction completed (i.e. Booking)
- Customer checked account balance through mobile banking app
- Portfolio risk position changed

\* Events are by design not intended to only contain normalized data.

\*\* Contextless means they can be interpreted without additional context. If additional context is useful, events should contain that context.





## 2. Information Object Model

```
{
  "namespace": "nl.rabobank.beb.payments.trb",
  "type": "record",
  "name": "CardsTransactionEvent",
  "doc": "Much of the content herein is based on the ISO 8583:1993 standard",
  "fields": [
    {
      "doc": "Timestamp of the event",
      "name": "timestamp",
      "type": "long"
    },
    {
      "doc": "The application name that generated this event",
      "name": "source",
      "type": "nl.rabobank.beb.general.Application"
    },
    {
      "doc": "Message type identifier",
      "name": "messageTypeIdentifier",
      "type": "string"
    },
    {
      "doc": "Contains the primary account number (PAN) of the cardholder account involved in the transaction",
      "name": "primaryAccountNumber",
      "type": "string"
    },
    {
      "doc": "ISO 8583:1993 standard processing code",
      "name": "processingCode",
      "type": [
        "null",
        "nl.rabobank.beb.payments.trb.ProcessingCode"
      ],
      "default": null
    }
  ]
}
```

### Events

- Events
- Events
- Events
- Events
- Events

### Example

- Transaction
- Customer
- Portfolio
- \* Events
- \*\* Context

### Rules



# KEEP CALM & FOLLOW THE RULES

useful, events should contain that context.

# 3. Central Repositories

## Objectives

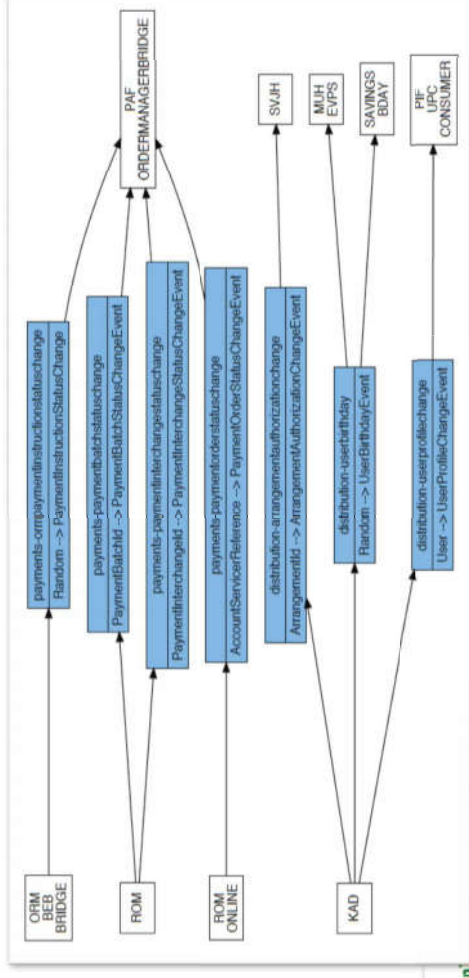
- Maintain control over your streaming landscape
- Promote reuse of existing data streams
- Allow stream and schema versions to co-exist

## Stream Repository

- Central repository with stream definitions
- Administers stream properties like ownership, retention time and message formats
- Deployable to different environments

## Schema Repository

- Central repository where schemas are registered and maintained
- Contains all versions of schema and allows for comprehensible schema evolution
- Confluent Schema Registry enforces schema as data contracts at runtime



```
{
  "namespace": "n",
  "doc": "Update event for creditcard issuing.",
  "name": "CreditCardData",
  "type": "record",
  "fields": [
    {
      "doc": "The identification of the credit card agreement in the pay",
      "name": "agreementId",
      "type": "CreditCardAgreementId"
    },
    {
      "doc": "A unique meaningless identification of a credit card.",
      "name": "creditCardId",
      "type": "string"
    }
  ],
  {
    "doc": "The last four digits of the number printed on the credit c",
    "name": "creditCardNumberLastFour",
    "type": [
      "null",
      ..
    ]
  }
}
```



# 4. Self-Service

## Power to the Teams

- There is a general shift in enterprises towards DevOps and autonomous teams
- Teams must be empowered to take control over their applications in every way
- Through Self-Service we want to allow everyone to create, modify and deploy streams, easily and securely

## Management UI

- Simple and uniform interface for functional maintenance
- Allows configuration of Environments, Applications and Streams
- Strict ownership rules allow regulation of responsibilities
- Easy deployment of configured data streams

## Management API

- The UI uses a REST API to modify catalog information
- The API can also be called from CI/CD workflows

The screenshot displays the Axual Streams Management UI. The top navigation bar includes the Axual logo and the text 'real-time data solutions'. The main header shows 'Streams > payments-cnaaccountentryrowupdate'. The left sidebar contains icons for Home, Streams, Applications, and Environments.

The main content area is divided into several sections:

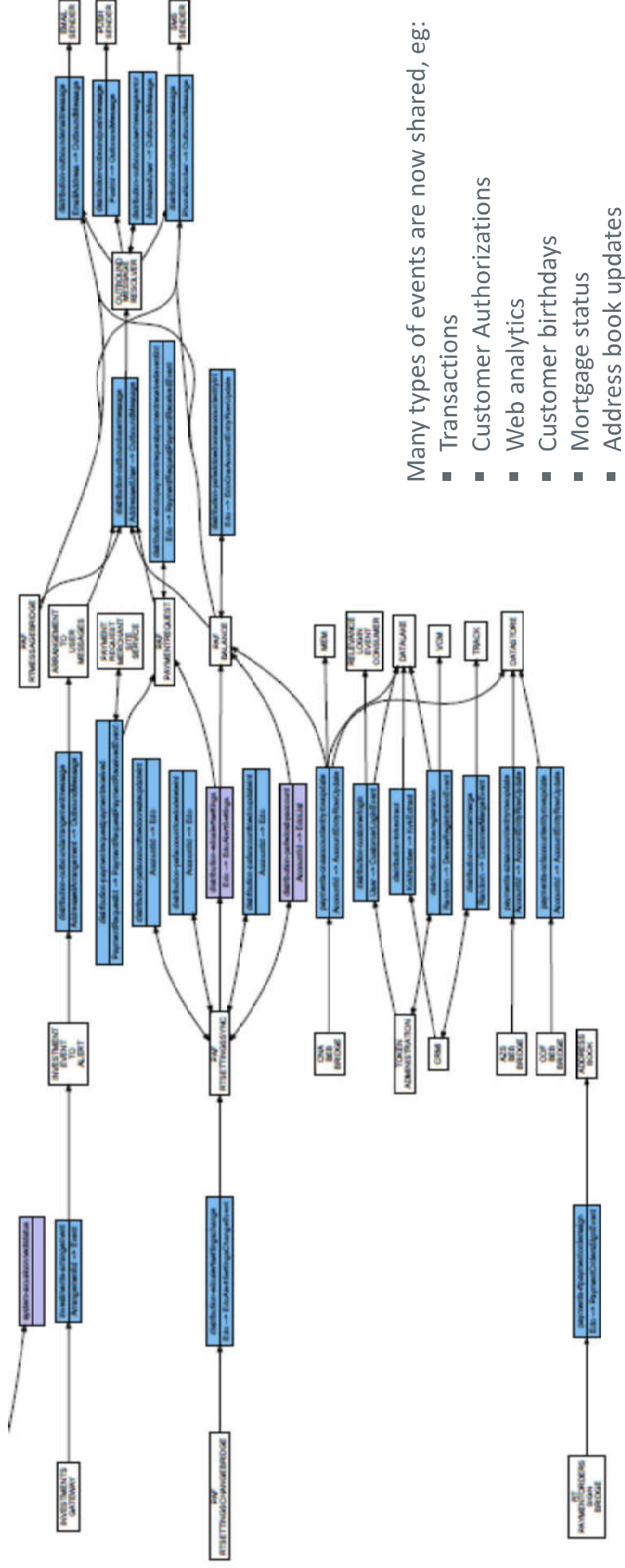
- Stream Details:**
  - Name:** payments-cnaaccountentryrowupdate
  - Description:** This topic contains insert/update events from the CNA database, where every update is published as a separate event.
  - Owner:** payments-cnaaccountentryrowupdate-group
  - Key type:** AVRO.nl.rabobank.beb.payments.AccountId
  - Value type:** AVRO.nl.rabobank.beb.payments.cna.AccountEntryRowUpdate
- Deployments:** A dropdown menu showing 'prod'.
- Producers:** A green box labeled 'CNA-BEB-BRIDGE'.
- Consumers:** A diagram showing the stream 'payments-cnaaccountentryrowupdate' with a retention time of 7 hours, connected to three databases: 'DATABASE', 'PAY-BALANCE', and 'DATABASE'.

At the bottom, there is a table titled 'Approved stream access' showing the following data:

Stream	Consumes from	Environment	Request approved at
DATABASE	payments-cnaaccountentryrowupdate	prod	07/06/2018
CNA-BEB-BRIDGE	payments-cnaaccountentryrowupdate	list	07/06/2018
CNA-BEB-BRIDGE	payments-cnaaccountentryrowupdate	prod	07/06/2018
CNA-BEB-BRIDGE	payments-cnaaccountentryrowupdate	ota	07/06/2018
PAY-BALANCE	payments-cnaaccountentryrowupdate	list	07/06/2018
BALANCE	payments-cnaaccountentryrowupdate	prod	07/06/2018

A 'Send a message' button is located at the bottom right of the table.

# Rabobank: “Events are key assets”



# Some statistics

≈65

Managed streams

40

Environments  
supported

135

Data Schemas

50+

Consumer/producer  
applications

40+

Teams supported

14k

Events/sec  
continuously (avg)

≈ 500M

Events/day

4

Data centers  
(On-prem & in Cloud)

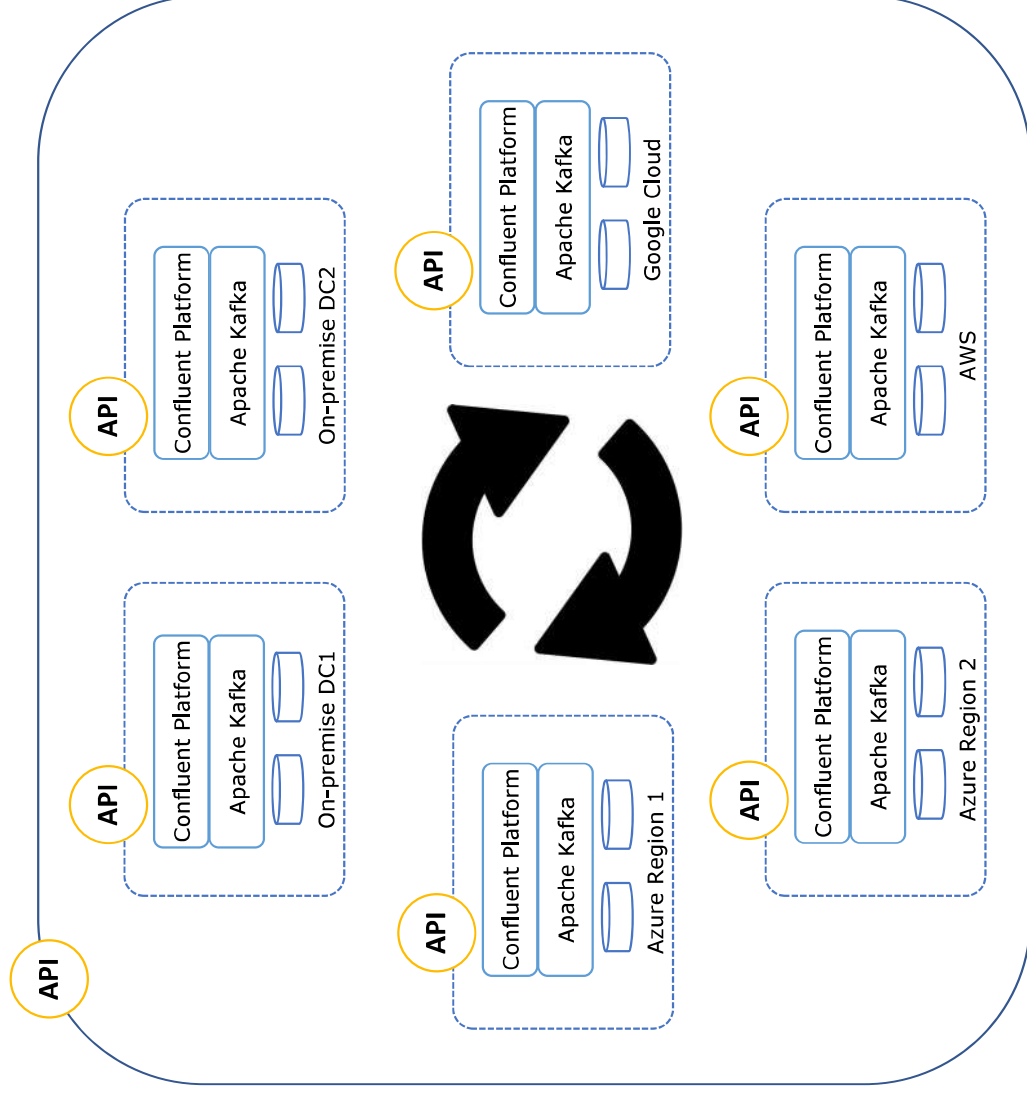
# Future steps

- **Rabobank**

- Scale up use with microservices
- API and events collaboration
- More real-time business

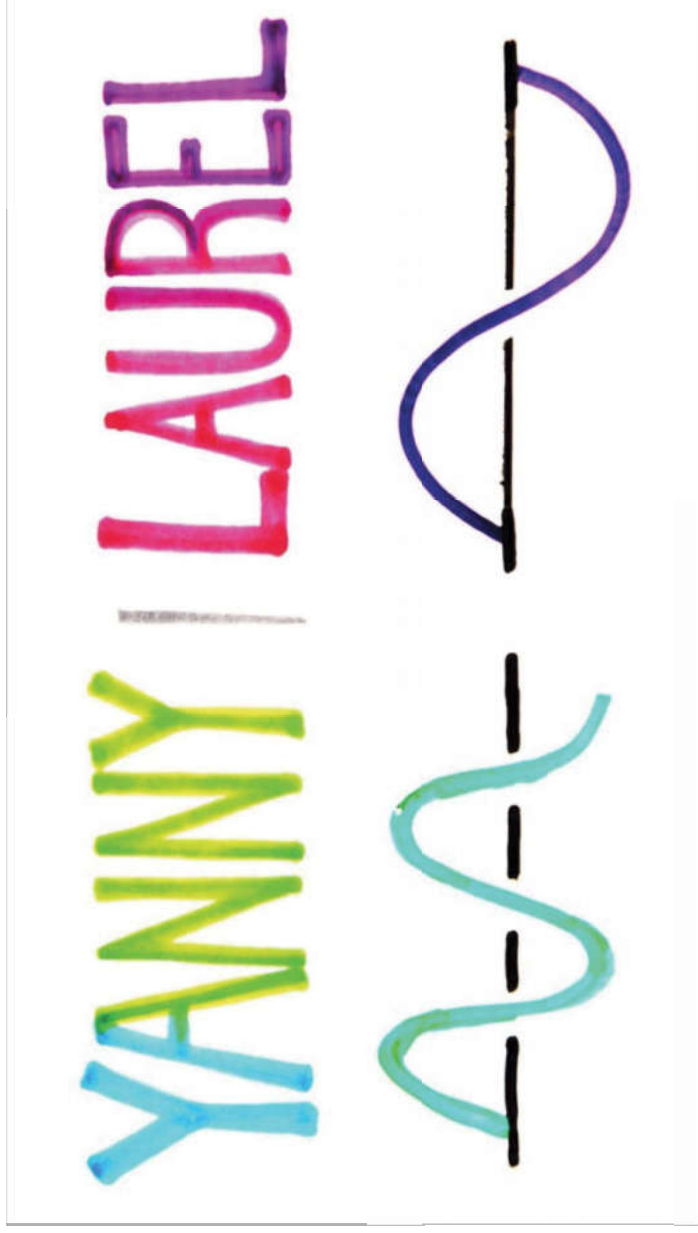
- **Axual**

- Productized as Axual Platform
- Scale out to other customers
- Launch platform in Public Cloud
  - Microsoft Azure (Q1 2019)
  - AWS (Q2/3 2019)
- Many new features to come...





# What about you?





# paths are made by walking.

Franz Kafka

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